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ABSTRACT

This curriculum guide lists concepts and objectives for water study units in grades 1-6 and for secondary classes. Geared especially for this particular environmental center is a collection of teacher guidelines with possible trips and activities. A listing of the center's materials is also included. This work was prepared under an ESEA Title III contract. (LS)

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ESEA TITLE III

TAYAMENTASACHTA

A Center For Environmental Studies

Environmental Studies Concepts and Objectives
Science Equipment and Material List
Teacher Guideline For Use Of The Center

Greencastle-Antrim School District
370 South Ridge Avenue
Greencastle, Pennsylvania 17225
October 2, 1972

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Developed as part of an ESEA Title III project in
cooperation with the Pennsylvania Department of Education

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Foreword

The following concepts and objectives have been compiled for integration into the present curriculum for water study. It is not intended that these materials should be used solely in any one subject but rather they should be intertwined with study areas most appropriate for the concepts. The material should be used at the grade level or subject area indicated. It should be noted that teachers are not bound by these concepts alone. They may develop new ideas and approaches that do not directly interfere with pre or post grade levels and can serve to compliment these materials.

This summary is an educational beginning that reflects a continuing concern for improving the environment. It is hoped that teachers will use this material in a systematic manner to help students develop an awareness that will preserve man's natural surroundings.

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To facilitate the realization of these concepts and objectives, a list of equipment and instructional materials, available at the Center For Environmental Studies, is included in this booklet. Teaching guidelines for class use of the Center are, also, included.

All of this information has been developed by a committee of teachers directed by Dale L. Gearhart, Science Curriculum Coordinator and Fred C. Kaley, who is responsible for the facility development of the Center.

W. P. Conrad
Superintendent

TAYAMENTASACHTA

A Center For Environmental Studies

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Elementary

First Grade

A. Concept: Plants and animals can survive and grow in a terrarium without continuous addition of water.

Objectives:

1. The students will orally explain, after observation, how water appears in a terrarium.
2. Students shall collect the necessary materials to complete their own terrarium and assemble it.
3. A description of how plants and animals are interdependent within an environment shall be given by the students.

B. Concept: Plants need water.

Objectives:

1. Using plants from a class plot previously planted, the students shall orally explain how varying amounts of water affect a growing plant.
2. Students shall draw a simplified illustration of a plant showing its parts.
3. Following directions given by the teacher, the students shall plant a seed, care for it and record its growth on a prepared chart.

C. Concept: Water has several forms.

Objectives:

1. The students will describe properties of water and its forms by using the senses.
2. Changing water from one form to another form shall be demonstrated by the students.

D. Concept: Objects either float or sink in water.

Objectives:

1. The students shall demonstrate a method for determining whether an object will or will not float.
2. At least one characteristic of a floating object shall be named by the student.
3. Students shall group objects into floating and non-floating sets.
4. A demonstration showing that objects weigh less in water shall be given by the students.

Second Grade

A. Concept: There are temperature variations in warm water and fresh water ponds.

Objective:

1. The students shall be able to obtain and record the temperature of a warm water and fresh water pond for comparison.

B. Concept: Much activity and beauty surround a pond.

Objective:

1. Given a limited amount of time, students shall indicate orally or through writing, nouns, verbs, adjectives, and adverbs that can be related to life around the pond.

C. Concept: Using water to extinguish a fire.

Objective:

1. Students shall extinguish a camp fire, using the water from the pond.

D. Concept: Oil protects and aids ducks.

Objective:

1. Using a feather for demonstration, the students shall be able to show how a feather repels water and explain why.

E. Concept: Fish use the air in water to breathe.

Objective:

1. Students shall observe the mouth and gill movements of a trout and draw the parts identified through appropriate labeling.
2. Students shall demonstrate that air exists in water by allowing it to stand for a period of time.

Third Grade

A. Concept: Water has energy which will do work that can change the environment.

Objectives:

1. Students shall demonstrate work possibilities and identify the force being used.
2. Students shall be able to write a list of ten ways water is used today and ten ways it was used in colonial days.
3. Students shall identify the source of water and discover how the water is used.
4. Given the necessary material, students shall construct a water wheel and demonstrate how energy is obtained from it.
5. Students shall be able to show the teacher various places at the Center where water has affected the soil.

B. Concept: Man's activities affect his resources.

Objectives:

1. By observation, students shall name and identify five characteristics of clean and polluted water.
2. Students shall be able to construct and demonstrate two different ways to purify water at the pond.
3. Given the necessary materials, students shall distinguish differences between soft and hard water.
4. Students shall demonstrate that water is a valuable resource by the way he uses it on a field trip.

C. Concept: Plant and animal life is dependent upon clean water.

Objectives:

1. At the pond, students shall identify at least five plants, animals, and insects that depend on water for survival.

2. Students shall record, by drawing, observations of living things that live in or near the pond.

3. Students shall be able to name three things in the pond that are necessary for plants and animals to exist.

4. Students shall be able to demonstrate how a balance of plants and animals is necessary for a healthy pond.

Fourth Grade

A. Concept: Man demands a large supply of clean water.

Objective:

1. The students shall be able to describe ten ways man uses clean water.
2. Students shall construct a bulletin board depicting various domestic, recreational and industrial uses of water.
3. Students shall design and make posters illustrating the daily use of water by the average American.

B. Concept: Water Erosion.

Objective:

1. Students shall be able to describe what is meant by erosion.
2. Students shall explain two ways water erodes soil.
3. The effects of splash and gully erosion on an unprotected field shall be understood and demonstrated by the students.

Fifth Grade

A. Concept: Water Filtration

Objective:

1. Students working in groups will determine the effectiveness of a sand filter and a soil filter for improving the cleanliness of water.

B. Concept: What happens to water after it falls.

Objective:

1. Each student will make a drawing or diagram of the water cycle showing evaporation, transpiration, vapor formation and falling condensation.

C. Concept: Tayamentasachta Watershed

Objective:

1. As a result of the suggested activities in the lesson, students will summarize, in written form, several possible dangers and strengths of the watershed at Tayamentasachta.

D. Concept: How fast soils absorb water.

Objective:

1. Students working in groups will experiment to determine how rapidly different types of soils absorb water.
2. Records will be made of results and conclusions reached as to which soils are most susceptible to erosion during heavy rains.
3. Students should interpret their findings to one or more of the following advantages of soils with good water intake:

a. Less run off, therefore, less erosion.

b. Water which soaks the soil is available to plants later on.

c. Easy water movement in soil is a sign of good air circulation for the development of roots and growth of life.

Sixth Grade

A. Concept: Importance of an adequate supply of clean water.

Objectives:

1. The students shall be able to relate some of the most pressing conservation problems; tell why they are critical; and how they are being solved.
2. By observation, students shall record data of various streams in the area as to their cleanness and note reasons for the streams' condition.
3. After a field trip to the pond, the students shall be able to compile a list of things that depend on a clean supply of water.
4. Students shall demonstrate various methods of water purification.
5. Using a local topographical map, students shall be able to locate the local water supply areas.
6. Given a piece of aluminum foil, pie pan and tin can, students shall set up and operate a simple watershed.

Secondary

General Science

A. Concept: How speed and volume of a stream affect the amount of material carried by the stream.

Objectives:

Having completed the lesson, the students shall be able to:

1. Measure water accurately with a graduated cylinder.
2. Measure angle accurately with a protractor.
3. Weigh things accurately with a balance scale.
4. Describe how the speed and volume of water affect the amount of material it carries.

B. Concept: Relationship between land and water temperatures.

Objectives:

Having completed the exercise, the students shall be able to:

1. Read thermometers to the nearest degree.
2. Describe the differences in heating of land and water.
3. Describe the difference in cooling between land and water.
4. Construct a graph showing these differences.

C. Concept: Variations in temperature of spring water in relationship to distance from the source.

Objectives:

Having completed the exercise, the students should be able to:

1. Read a mercury thermometer accurately.
2. Measure with a tape measure accurately.
3. Construct a graph using two variables.
4. Describe the temperature change that occurs in spring water as the distance from its source increases.

D. Concept: Temperature variations with depth in a warm water pond.

Objectives:

Having completed the exercise, the students shall be able to:

1. Measure accurately with a yard stick.
2. Draw a graph showing how the temperature varies with depth in a warm water pond.

General Science

A. Concept: A hay infusion will demonstrate how a succession of species will form a community.

Objective:

Given the necessary materials, students will prepare a hay infusion and note the results.

B. Concept: The temperature of water influences the action and survival of organisms living in it.

Objective:

Given the required materials, students will determine how boiling affects life in water.

C. Concept: Green plants start the food supply for an entire pond community.

Objective:

Given the necessary equipment, students will collect algae from a tree and from a pond to make microscopic comparisons.

D. Concept: The algae are primary producers of food in the aquatic world.

Objective:

Given the necessary materials, students will collect chlorella and record on a chart the growth and reproduction under different environmental conditions.

E. Concept: The life cycle of a dragonfly.

Objective:

Given the necessary materials, students shall collect dragonfly nymphs and adults from the pond area and describe their physical appearance and life cycle.

F. Concept: Different kinds of animals have various feeding habits.

Objective:

Given the necessary materials, students shall describe the unusual feeding habits of the hydra.

General Science

A. Concept: An investigation of the physical properties of water and how these properties are related to the environment - water waves.

Objectives:

When the students have completed their study, they will:

1. Give word definitions of the basic wave concepts of wave length, frequency and velouty.
2. Indicate on a diagram of a simple wave the wave-length amplitude, crests, and troughs.
3. Use the relationship between wave-length, frequency and velocity to work a simple problem involving these quantities.

B. Concept: Factors controlling water vapor in the air.

Objectives:

The students shall:

1. Understand the relationship between temperature and the saturation point of air.
2. Be able to define saturated air.
3. Understand that saturation can occur at any temperature and is necessary for precipitation or condensation in any form.
4. Be able to define dew point.
5. Calculate relative humidity.

C. Concept: An investigation of the physical properties of water and how these properties are related to the environment - the hydrologic cycle.

Objectives:

The students shall:

1. Investigate the ways water gets into the atmosphere from the ground and how the water supply is constantly being replenished.

2. Describe the process involved in the natural recycling of water in nature.
3. Develop concepts concerning the importance of the water cycle to man.

General Science

A. Concept: Availability of an adequate supply of clean water and its importance.

Objectives:

1. The students shall construct a map, using a given scale which will include at least three area waterways.
2. Students shall be able to locate several causes for a muddy stream on a field trip and recommend ways of correcting the problem.
3. Using specific selected sites from a map:
   a. The students will collect water samples from two different streams and determine the amount of sediment present.
   b. Students shall determine and record on paper the chlorophyll producing plants per cubic centimeter.
   c. Students will collect and identify as to class a sample of each species of plant located.

Local And State Government

A. Concept: Importance of Water-flow Regulations.

Objectives:

1. The student shall know the functions of the water and Power Resources Board.
2. Students shall observe how the problem of stream flow modification has been handled at the outdoor center and then make suggestions as to how they would have solved the problem.
3. Students shall state conclusions, on one page or less, concerning the modification of a stream and whether it is within the framework of the law.

B. Concept: Importance of Fish Conservation.

Objectives:

1. The students shall know the historical background of Fish Conservation by reading and class discussion.
2. Students shall be able to operate and demonstrate water testing equipment.
3. Various methods of fish conservation shall be compared by the students.

C. Concept: Importance of a Pure Water Supply.

Objectives:

1. Students shall be able to identify problems in preserving a pure water supply.
2. Students shall be able to identify agencies who can help the present pollution problems.
3. Students shall be able to identify any water pollution problems at the Center.
4. Students shall demonstrate means of improving water supplies.

Language Arts

A. Concept: The haiku is a miniature poem, limited to seventeen syllables, usually written about nature.

Objectives:

1. The students will compare Japanese symbols of nature or examples of personification with American counterparts by listing at least five objects in nature which symbolize human characteristics.
2. Given definition and examples, the students will write a minimum of two poems which adhere to the haiku form of poetry.

B. Concept: Listening is an important skill involving auditory discrimination, analysis, and understanding.

Objectives:

1. The students will correctly recognize likenesses or differences in pairs of words with ninety percent accuracy. Their responses will use the every pupil response technique. These pairs of words will be read by the teacher.
2. The students will correctly discriminate with ninety-five percent accuracy a minimum of ten out door noises which have been pre-recorded.

Environmental Study Projects
of
Individual or Small Group Study

Projects noted below are a vital part of the Greencastle-Antrim outdoor education program at the Senior High which is closely correlated with the Environmental Center.

Students involved in the projects continue concurrently until their senior year.

Projects:

1. Weather Data - Students record daily weather data at weather station and utilize weather maps for forecasting. Students will be able to calculate the dew point and use adiabatic charts.
2. Utilizing rainfall records - Students calculate the fresh water pond discharge, at the Center, to show correlation with amounts of rainfall. Discharge graphs and transparencies shall be made to show the correlation.
3. Geological survey - A survey shall be made of traverse between Mercersburg - Greencastle- Waynesboro areas and a large marker will be erected over the contact between Beekmantown and Chambersburg limestone. Students shall make a survey of the limestone at the Environmental Center.
4. Paleontology collection - A paleontology collection from Pennsylvania will be made with emphasis on paleo from the local area.
5. Rock and mineral collection - A rock and mineral collection shall be made from Pennsylvania with emphasis on the local area.
6. Biology - Biological studies of soil and water microbes shall be made at the Center and microbes are to be identified.
7. Etomology - Students will collect and identify insects found at the Center.
8. Pollution Study - A study of stream pollution shall be made in the area on various waterways - testing for phosphate, nitrate and sulfate.
9. Weather Study - Students will record the evaporation rate, barometric pressure, relative humidity and temperature. The evaporation rate will be plotted on a graph against the relative humidity, temperature and barometric pressure.

Science Equipment and Material List
for
The Environmental Center

- TAYLMENTASACHE-

Listed below are the various materials and science equipment available on site at the environmental center.

Amount	Field Study Equipment
30	Lensatic Compasses
36	Butterfly Nets
33	Field Glasses
12	Pocket Stereoscopes
1	Tracking Set
2	Leaf Replica Sets
2	Auger Kits
2	Soil Thermometers
1	Soil Testing Kit
3	Chisel Hammers
3	Pick Hammers
1	Limnology Field Kit
1	Plankton Tow Net
1	Plankton Sieve Set
1	Secchi Disk
6	Plastic Buckets
4	Shovels
2	Galvanized Buckets
4	Rakes
6	Hammers
12	Screw Drivers (2 sizes)
10	Drill Bits (5 sizes)
24	Thermometers
2	Hand Drills
4	Hand Saws
18	Hand Magnifiers (2 sizes)

Miscellaneous items

Clip boards	Pencil Sharpeners
Staplers	Compasses
Scissors	Pipe Cleaners
Paper cutter	Theme Covers
Plastic rulers	Paper punch (3 hole & single)
Protractors	

Teaching Supplies

Composition books	Masking tape	Water colors
Writing paper	Glue (paste and Elmers)	Paint brushes
Duplicating paper	Rubber cement	Model clay
Graph paper	Pencils	India ink sets
Poster paper	Colored pencils	Marker sets
Master units	Crayons	Rubber bands
Thermal master units	Charcoal pencils	Paper fasteners
Paper clips	Tempera paints	Plaster of paris
Scotch tape	Finger paints	Construction paper

Amount	Laboratory Equipment
16	Microscopes (6 Stereo)
1	Soil Texture Classification and Secimentation unit
1	Conservation Education Unit
1	Deciduous Tree Identification Chart
1	Centrifuge
1	Dial-O-Gram Balance
6	Animal Cages
1	Incubator - Lab type
2	Weather check instruments
2	Max. - Min. Thermometers
1	Tru-chek rain guage
1	Poloroid microscope camera
1	Laboratory timer
2	Dissecting kits
1	Specimen dye kit
36	Medicine droppers
6	Test tube brushes
24	Beakers (4 sizes)
120	Test tubes (3 sizes)
3	Ring tripods
6	Erlenmeyer flasks
4	Funnels
3	Wire guages
1	Ring stand & support
1	Bio-Rack
1	Taylor complete weather station

Complete Outdoor Weather Station

Reference Books

40	Tree, Plant & Wildlife Manuals
40	Guides to Tracks of Wildlife
40	Guides to Edible & Useful Wild Plants

Peterson Field Guide Series - (6 of each)

Animal tracks	Ferns & Their Related Families
Birds	Reptiles & Amphibians
Butterflies	Rocks & Minerals
Wildflowers	Trees & Plants
Mammals	Stars & Planets

1	Webster Collegiate Dictionary

Amount	Dover Publications, Inc. Books		
1	Wild Flowers	1	Small Animals
2	Trees	1	Culinary Herbs
3	Turtles	1	Mushrooms
1	Weeds	1	Fishes
2	Ferns	1	Dyes
1	Old-Time Herbs		

J. B. Ferguson Publishing Company Series (1 each)

"People and Their Environment"

Grades 1 - 2 - 3
Grades 4 - 5 - 6
Science 7 - 8 - 9
Outdoor Laboratory
Biology
Home Economics Grades 7 - 8 - 9
Social Studies Grades 10 - 11 - 12

Audio-Visual Equipment and Materials

"Transparencies"

Botany
Weather Phenomena
Living Somewhere
Wildlife Resources
Soil & Land Resources
Forest Resources

Poloroid Camera and Film
Super 8 movie camera with sound recorder and film
35 mm slide film

TEACHER GUIDELINES FOR USE OF THE ENVIRONMENTAL CENTER

I. Preparing for the trip to the Center:

A. Select a lesson or lessons you would like your class to experience.

B. Make sure there are no conflicts at the Center that may interfere with your plans. Contact a supervisor for scheduling.

C. Investigate all possibilities for the lesson by visiting the Center or reviewing plans with a supervisor.

D. Organize your trip by:

1. Becoming thoroughly familiar with the trails or areas you plan to use.

2. Listing materials and equipment needed and arrange to have them available.

3. Preparing maps, charts, record forms, etc.

4. Informing students of their clothing requirements for the trip. (Examples: wear old clothes, bring a sweater, etc.)

5. Informing students of your plans and what you expect from them.

6. Making arrangements for bus transportation, if required.

7. Remembering that the walk or ride to the Center can also be an educational experience by using some game to sharpen senses.

II. The trip and Center activities:

A. Be sure your group is on time for arrival and leaving the Center.

B. Review with the group your purposes and expectations for the field trip.

C. Students should obey basic rules of courtesy and safety established by the teacher. These should include using the trash cans for discarding materials and refraining from playing in the water around the spring itself.

D. Group your students so that all can become involved in an activity and are able to see and hear the leader.

E. Allow enough time for observations, data recording, or investigations, but remember to keep things lively and varied.

F. If you see something exciting, don't hesitate to interrupt your planned activity. Some animals, insects or birds may not be seen again.

C. Don't be concerned about student questions that cannot be answered. Generally you can suggest a reference for the answer or a research project based on a question.

III. The follow-up:

A. Have students share their experiences.

B. Organize displays, reports, skits, etc., depicting activities or observations during the trip.

C. Build upon the field experience and encourage students to research any problems encountered to determine answers.

D. Evaluate the trip:

1. Were your objectives achieved?

2. Were there any unexpected problems?
Who was at fault? (Faculty, student, weather, teacher, etc?)

3. Should the next trip be the same or should it be changed?